



# Buying Tools for Fighting Teams

A Story with a Happy Ending: Part II

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**D**ear Reader, this story began in the November–December 2010 issue of *Defense AT&L*. I told you how, in a land so much like our own nobody could tell them apart, a Small Elite Amphibious Fighting Team (SEAFT) realized they had a problem, a problem they thought could be solved by a new portable radar. Unfortunately, the radar cost so much that they had to abandon their idea. But fortunately, another of the nation's fighting teams, the Above Low Objects Fighting Team (ALOFT), had noticed the new radar development and coveted it. The SEAFT was happy to share with the ALOFT the information and cost estimates they'd gathered. The ALOFT had a bigger budget, so they continued the development of the radar, creating

vital charts to help them negotiate the many offices of necessary supervision and review. But as the ALOFT gained more information about the radar, it became clear that it was going to cost more than they'd planned to spend. We left our hero—the ALOFT's tool buyer—grappling with the problem. We rejoin him as he attempts to work out a solution.

The tool buyer had been thinking very hard how to solve his problem. When the project started out, he had the data from the SEAFT, and he had solicited opinions from expert tool buyers from the private sector. Maybe the tool buyers weren't completely objective, but they were very experienced and would be bidding on the chance to build the radar; so it had been a good idea to ask their opinion. And it had also been a good idea to follow up by asking his own staff to confirm the private sector's experienced experts' estimate, even though the staff came up with a different answer. So over a period of a couple of years, he had come up with three answers: (1) the SEAFT's original estimate, based on incomplete data; (2) the estimates from the private sector, bid to fit within the available budget; and (3) an independent, objective estimate using reliable assumptions and the latest methodology that resulted in a much higher estimate than he could afford. It was a true dilemma for a tool buyer! What was he going to do?

It seemed the more anyone learned about building the new radar, the more expensive and difficult it appeared to be. Clearly it was going to be very hard to get permission to build it. So the professional tool buyer came up with an idea and sent it up through the many, many layers of important offices of necessary supervision and review—and in this case, I have to say that they did their job.

### **When One and One Makes ... One**

The tool buyer's idea was to get his boss's boss's boss to tell his boss (a person who had the authority to make important decisions about really expensive tools) that the radar was estimated first by the SEAFT and second by the tool buyer's staff, and not to mention the request for information estimate from the private sector. He decided to say he'd like to take the average of those two estimates as the official value of the radar development through the next kilometerstone. (One way you could tell this country apart from ours, however alike they were in other ways, was that it had wisely converted to the metric system because it was so much simpler.) A kilometerstone review required any tool-buying program to be approved by the ALOFT chief tool buyer or a very important deputy before it could go forward to the next kilometerstone to spend more

money. If the program were a little cheaper, the tool buyer reasoned, it could be reviewed by someone lower in the tool-buying decision chain of command; so getting an approval to treat the new radar as a cheaper program had a big advantage of time and understanding (but usually no fewer vital charts).

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As you probably know, an estimate is an informed and educated guess that is improved with more information and education. For the tool buyer to suggest that there were two estimates would be to forget, for the sake of convenience, that the first estimate (done by the SEAFT) had been done a very long time ago, with little information or understanding about developing the new radar; and the second government estimate was recent, with greatly improved information and analysis. One of the many, many layers of necessary offices of supervision and review actually read the supporting documentation and came to a logical conclusion.

That office told the professional tool buyer, "No! You do not have two estimates; you have one estimate."

### **Making a Decision Based on Evidence**

Now that stung a bit. The buyer chafed and vented to his friends, then eventually went back to thinking. And the thoughts he thought! What he ended up thinking was that his trouble was caused by an estimate that was too high. So if nobody believed the estimate with the best information and analysis, perhaps he could win approval for the amount of money to develop the new radar from the estimates provided by the private sector. So he built a chart. It was a good chart with lots of colors. It explained the possibility that the actual amount of research, development, test, and evaluation money it would take to develop the new radar would be at or less than a certain figure. The evaluation of that possibility was done by his expert estimating staff. Ironically, although our hero built this vital chart using the very probability profile his own government estimators created, his purpose was to discredit the estimate it was based on! He thought that by comparing the very high current estimate to the earlier estimates, it would look so much more expensive that nobody could possibly think the new radar would take so much research, development, test, and evaluation money to develop!

The professional tool buyer unleashed the chart on his critics! And it was powerful. It was so powerful that everyone who saw it—that is, everyone who didn't already think they knew the answer—immediately recognized that the original SEAFT

estimate didn't have the best information and couldn't possibly be right anymore; and the private sector contractor requests for information were clearly based on an over-eager desire to fit into a predetermined budget limit. Neither of the first two estimates explained the true amount of effort, risk, and uncertainty involved in developing the new radar.

The only reasonable, responsible course of action was to accept the most current, objective, and informed estimate as the basis from which to make a decision.

### Not Just Having a Process but Using It, Too

If you think back to how the SEAFT developed their original estimate, you will remember they weren't at all sure of how much work needed to be done. The ALOFT, on the other hand, were able to spend more time and learn much more about the work that needed to be accomplished. That explains the large difference between the original \$150 million research, development, test, and evaluation estimate prepared by the SEAFT and the 80 percent confidence level estimate of nearly \$800 million prepared by the ALOFT cost analysts, which you can see illustrated in the chart below. It wasn't, and never had been, because the estimates disagreed with each other. The difference occurred over time because people learned more about the elements that made up the new radar. It was a natural growth.

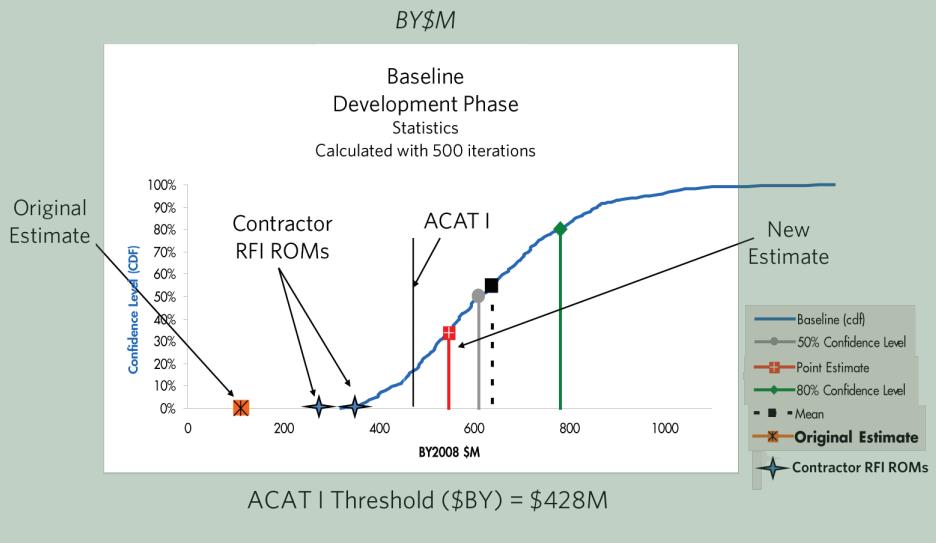
It's not cause for suspicion but for recognition that as time goes on, more will be known about a project effort; there will be less risk and uncertainty; and the answer will become more clear and defined. It doesn't mean the final cost at completion will be less or any different at all. It means we will have

more knowledge about the answer; be more certain about it; and we will make a better prediction that will be more likely to hold up through the design, development, production, and integration processes.

The proposals made by the defense contractors from the private sector in the request for information were made before the ALOFT engineers and analysts did much of their work. So they were based on more evidence than the SEAFT had, but not as much as the ALOFT had. The defense contractors also had the extra information of how much money the ALOFT had available to spend on the radar development. Naturally, nobody was really willing to say how that information helped them build their estimate, as it didn't help explain anything that was needed to build a new radar, except maybe how many people they could hire at one time.

In exasperation, the professional tool buyer gave up trying to convince his boss's boss's boss that the new estimate was unrealistic. He added a two-year \$50 million technology demonstration phase (a subset of the research, development, test, and evaluation phase) to his schedule. He planned to do cost comparison studies, trade-off analyses, and technology maturity work to reduce the risk, uncertainty, and overall cost associated with developing the new radar. He briefed this planned effort—now much longer than expected—to his boss's boss's boss. He even invited the SEAFT to talk about what they knew about the new radar and how much they needed it to continue defeating their nation's enemies. The decision-making boss was completely satisfied and congratulated the professional tool buyer on his achievement of correctly identifying the best analysis and best possible course of action to develop the new radar for the ALOFT.

### Range of RDT&E Estimates



"This is exactly the right way to do this work. It is exactly what the many, many layers of important offices of necessary supervision and review were asking you to do. They should be thrilled!" said his boss's boss's boss. And they were. The professional tool buyer accepted the praise and looked very determined to get the cost of the radar down, if it was the last thing he ever did! And maybe he will ....

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